



# LC89901V

## CMOS Driver IC for 1/5 and 1/6 Inch Image Sensors

### Overview

The LC89901V is a high breakdown voltage CMOS vertical driver IC for 1/5 and 1/6 inch image sensors. Provision of a built-in level shifter means that an external clamp circuit is no longer required.

### Applications

Surveillance cameras and image input equipment

### Functions

CMOS driver IC for 1/5 and 1/6 inch image sensors

### Features

- CMOS process fabrication for low power dissipation
- Built-in level shifter circuits to reduce the number of required peripheral circuits.
- Miniature package (SSOP-24)

### Structure

- Inverter type drivers: 8 channels  
Input pulses are converted to  $V_{CC1}$ ,  $V_{CC2}$  and  $V_{EE1}$ ,  $V_{EE2}$  levels (inversion).  
These are drivers for image sensor imaging and storage sections.

- Inverter type driver: 1 channel

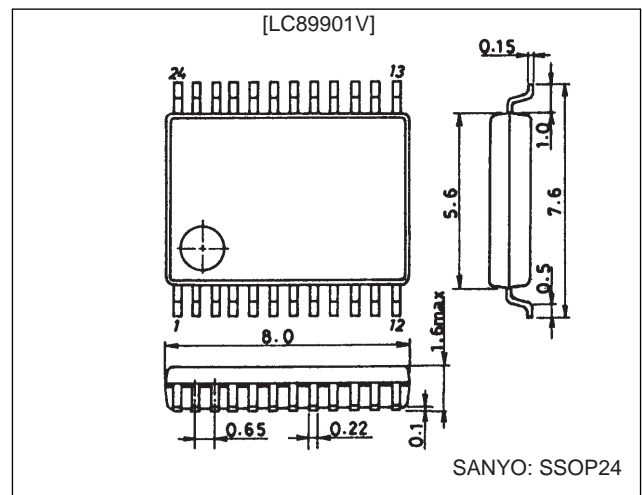
Input pulses are converted to  $V_{CCN}$  and  $V_{EE1}$ ,  $V_{EE2}$  levels (inversion).

This circuit is an image sensor NSUB driver.

### Package Dimensions

unit: mm

#### 3175A-SSOP24



### Specifications

#### Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

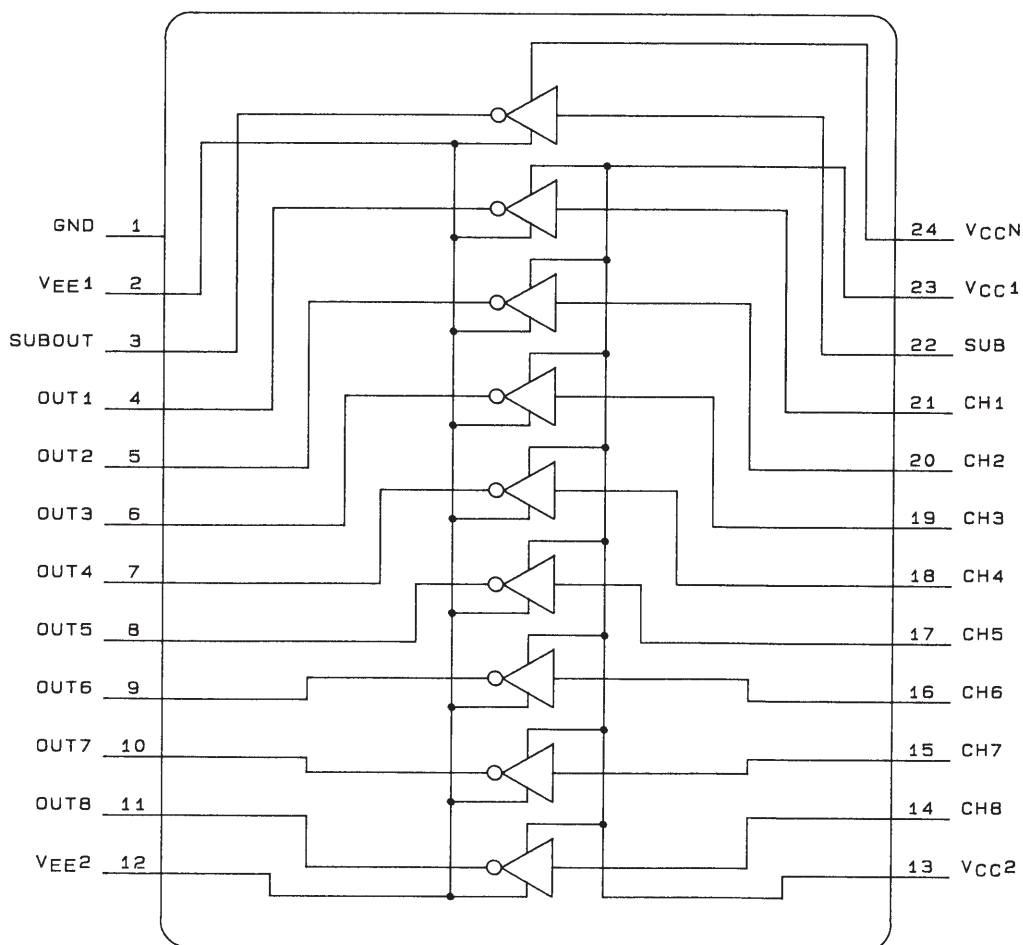
Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC \text{ max}}$	$V_{CC1}, V_{CC2}, V_{CCN}$	-0.3 to +6.0	V
	$V_{EE \text{ max}}$	$V_{EE1}, V_{EE2}$	+0.3 to -11.0	V
Input voltage	$V_{IN}$	All input pins	-0.3 to $V_{CC} + 0.3$	V
Allowable power dissipation	$P_d \text{ max}$		350	mA
Operating temperature	$T_{opr}$		-10 to +70	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-40 to +125	$^\circ\text{C}$

#### Allowable Operating Ranges at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	$V_{CC}$	$V_{CC1}, V_{CC2}, V_{CCN}$ : * $V_{CCN} \leq V_{CC1}, V_{CC2}$	4.5 to 5.5	V
	$V_{EE}$	$V_{EE1}, V_{EE2}$	0 to -10.5	V
Input voltage range	$V_{IN}$	All input pins	0 to $V_{CC}$	V

## LC89901V

### Block Diagram



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### Electrical Characteristics at $T_a = 25^\circ\text{C}$ , $V_{CC1}, V_{CC2}, V_{CCN} = 5.0\text{ V}$ , $V_{EE1}, V_{EE2} = -10.0\text{ V}$

Parameter	Symbol	Conditions	min	typ	max	Unit
Input high level current	$I_{IH}$	All input pins, $V_{IN} = 5.0\text{ V}$		10		$\mu\text{A}$
Input low level current	$I_{IL}$	All input pins, $V_{IN} = 0\text{ V}$		5		nA
Current drain	$I_{CCH+}$	$V_{CC1}, V_{CC2}, V_{CCN}$ , all input pins, $V_{IN} = 5.0\text{ V}$		1		$\mu\text{A}$
	$I_{CCH-}$	$V_{EE1}, V_{EE2}$ , all input pins, $V_{IN} = 5.0\text{ V}$		-10		$\mu\text{A}$
	$I_{CCL+}$	$V_{CC1}, V_{CC2}, V_{CCN}$ , all input pins, $V_{IN} = 0\text{ V}$		7		$\mu\text{A}$
	$I_{CCH-}$	$V_{EE1}, V_{EE2}$ , all input pins, $V_{IN} = 0\text{ V}$		-2		$\mu\text{A}$
Output voltage	$V_{OH}$	All inputs, $V_{IN} = 0\text{ V}$		5.0		V
	$V_{OL}$	All inputs, $V_{IN} = 5.0\text{ V}$		-10.0		V
Operating output voltage*	$V_{OH2}$	Load = LC9997, input = LC99052		5.0		V
	$V_{OL2}$	Load = LC9997, input = LC99052		-10.0		V
Operating current drain*	$I_{CC2+}$	Load = LC9997, input = LC99052		1.62		mA
	$I_{CC2-}$	Load = LC9997, input = LC99052		1.61		mA

Note: Load conditions  
Load circuit

$$R_L = 18\ \Omega, C_L = 780\ \text{pF}$$

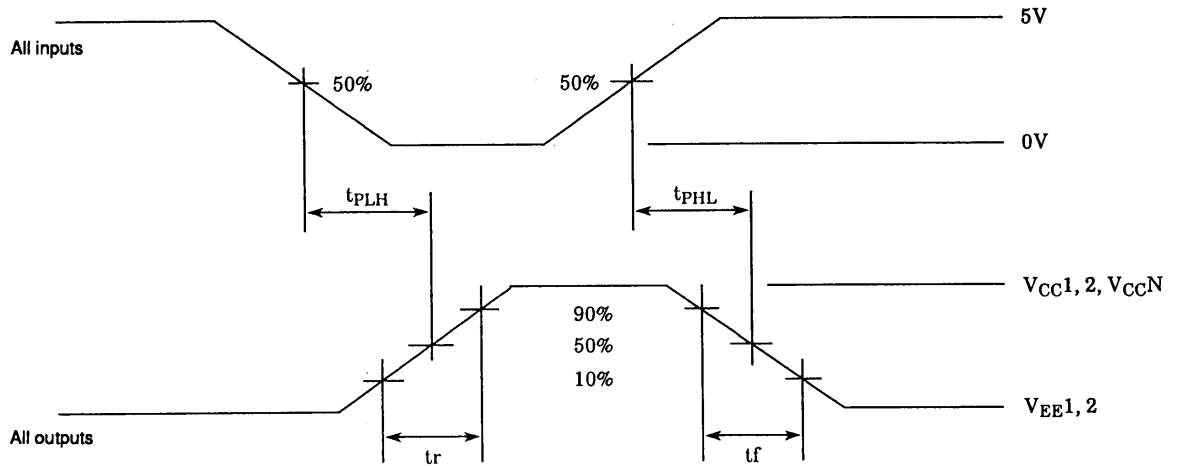
\* Reference values for driving an LC9997 image sensor with pulses input from an LC99052 timing LSI.

## LC89901V

**Switching Characteristics at  $T_a = 25^\circ\text{C}$ ,  $V_{CC1}$ ,  $V_{CC2}$ ,  $V_{CCN} = 5.0\text{ V}$ ,  $V_{EE1}$ ,  $V_{EE2} = -10.0\text{ V}$ ,  $f_{IN} = 3.58\text{ MHz}$**

Parameter	Symbol	Conditions	min	typ	max	Unit
Propagation delay Low level $\rightarrow$ high level t <sub>PLH</sub>	t <sub>PLH</sub>	All output pins		23		ns
Propagation delay High level $\rightarrow$ low level t <sub>PHL</sub>	t <sub>PHL</sub>	All output pins		31		ns
Rise time	t <sub>r</sub>	All output pins		47		ns
Fall time	t <sub>f</sub>	All output pins		42		ns

### Switching Waveforms



### Truth table

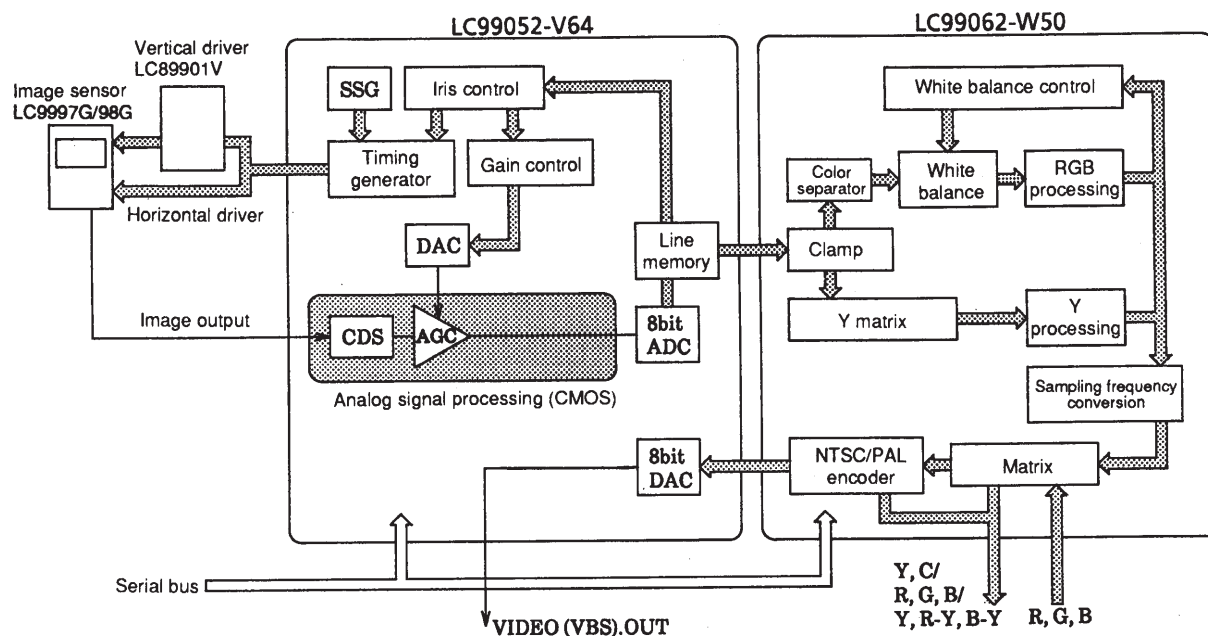
		Output
Input	H	$V_{OL}$
	L	$V_{OH}$

### Pin Functions

Pin No.	Pin	Function
1	GND	Ground
2	$V_{EE1}$	Negative power supply for setting the low level
3	SUBOUT	NSUB driver output
4	OUT1	Channel 1 driver output
5	OUT2	Channel 2 driver output
6	OUT3	Channel 3 driver output
7	OUT4	Channel 4 driver output
8	OUT5	Channel 5 driver output
9	OUT6	Channel 6 driver output
10	OUT7	Channel 7 driver output
11	OUT8	Channel 8 driver output
12	$V_{EE2}$	Negative power supply for setting the low level
13	$V_{CC2}$	Positive power supply for setting the high level
14	CH8	Channel 8 driver input
15	CH7	Channel 7 driver input
16	CH6	Channel 6 driver input
17	CH5	Channel 5 driver input
18	CH4	Channel 4 driver input
19	CH3	Channel 3 driver input
20	CH2	Channel 2 driver input
21	CH1	Channel 1 driver input
22	SUB	NSUB driver input
23	$V_{CC1}$	Positive power supply for setting the high level
24	$V_{CCN}$	NSUB driver positive power supply

### Sample Application Circuit

This figure shows the block diagram of an image sensor based digital camera using the Sanyo LC99052-V64, LC99062-W50 and LC89901V.



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